

**What Is Claimed Is:**

- 1           1.    A filter circuit, comprising:  
2           a transconductance device for outputting a current signal  
3                according to an input voltage and a feedback voltage;  
4           a transresistance device coupled to the transconductance  
5                device for outputting a output voltage according to  
6                the current signal, wherein the transresistance  
7                device comprises:  
8                a first capacitor;  
9                a resistor network coupled to the capacitor and  
10              the transconductance device comprising a plurality  
11              of stages connected serially, wherein each stage of  
12              the resistor network comprises:  
13                an input node;  
14                an output node;  
15                a first resistor coupled between the input  
16                node and the ground; and  
17                a second resistor coupled between the input  
18                node and the output node;  
19           wherein a time constant of the filter circuit is determined  
20                by the first capacitor and the resistor network; and  
21           a feedback device coupled between the transconductance  
22                device and the transresistance device for outputting  
23                the feedback voltage according to the output voltage.
- 1           2.    The filter circuit as claimed in claim 1, wherein the  
2           transconductance device comprises:  
3                a first operational amplifier having a first  
4                non-converting input terminal coupled to a ground,

5           a first converting input terminal and a first output  
6           terminal to output the current signal;  
7           a first resistor coupled to the first output terminal and  
8           the first converting input terminal; and  
9           a second resistor coupled to the first converting input  
10          terminal for receiving the input voltage.

1           3.    The filter circuit as claimed in claim 1, wherein the  
2    transresistance device comprises:  
3           a    second   operational   amplifier   having   a   second  
4               non-converting input terminal coupled to a ground,  
5               a second converting input terminal and a second  
6               output terminal to output the output voltage;  
7           the first capacitor coupled to the second output terminal  
8               and the second converting input terminal; and  
9           the resistor network coupled to the second converting input  
10          terminal for receiving the current signal.

1           4.    The filter circuit as claimed in claim 3, wherein the  
2    resistance of the first resistor is two times larger than the  
3    resistance of the second resistor.

1           5.    The amplifier circuit as claimed in claim 4, wherein  
2    the equivalent resistance of the resistor network is  $2^n \times R$ ,  
3    wherein the resistor network includes  $n$  stages and the  
4    resistance of the second resistor is  $R$ .

1           6.    The amplifier circuit as claimed in claim 3, wherein  
2    each of the first resistor and the second resistor is implemented  
3    by a MOS transistor.

1           7.    The filter circuit as claimed in claim 1, wherein the  
2 feedback device comprises:

3           a    third   operational   amplifier   having   a   third  
4                non-converting input terminal coupled to a ground,  
5                a third converting input terminal and a third output  
6                terminal to output the output voltage;

7           a third resistor coupled to the third output terminal and  
8                the third converting input terminal; and

9           a fourth resistor coupled to the third output terminal for  
10               outputting the feedback voltage.